THE ZOOLOGIST

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SOME MISCELLANEOUS NOTES FROM GREAT YARMOUTH (1913).

By Arthur H. Patterson.

In entering notes into my logbook (a practice I have kept up since 1878), I have made it a constant habit to stand sponsor to only those that chronicle my own observations, with a careful overhauling of the few outside records admitted from other sources. I am confident that many rare and entertaining incidents are lost among gunners, fisherfolk, and those who see or handle creatures living or dead; and "more's the pity." My own opportunities for field work are somewhat restricted, and not every ramble in this over-drained, over-built, over-populated locality yields matter for delight and recording.

On January 10th flocks of nine, eleven, and thirty Brent Geese were observed flying outside the breakers, going southward. A south-easterly gale was setting in.

Quite one hundred and fifty Knots on Breydon on January 18th. I noticed a punt-gunner slyly sidling up to a flock of tame Geese that had assumed a semi-wild life, and had taken to gathering crustaceans and mollusca from the *Zostera*. I certainly thought he was about to try his accuracy of aim upon them, which he might have done, I imagine, with impunity, as I was the nearest to him, a good mile of flat and "drain" intervening between us. Fortunately for himself perhaps, as well as the fowl, a flock of Brent Geese flew between him and the tame birds, and drew him higher up Breydon in pursuit.

March 4th.—A number of northward-bound Redwings passed over, with large flocks of *Corvidæ* following in their wake. On March 14th Redwings were still plentifully flying N.E., whilst Blackbirds could be distinctly heard above head on the drizzly nights prevailing at the end of the month and early in April.

Nearly two hundred Wigeon on Breydon on March 17th. We still annually get a goodly number, week after week, during the period of the spring migration, the birds being attracted, as they have been probably for centuries past, by the *Zostera marina* clothing the mud-flats.

Water-Rails would seem to run some risk when making for their spring quarters. Two were shown to me in the earlier half of April that had come to grief, probably from contact with telegraph-wires. The first had entered a cellar on the quay-side; the second, with its breast bared of feathers and two rather bad bruises, was penned in a cage in the cattle sale-ground, and kept there for my inspection.

On May 2nd a Land-Rail, another species much given to eccentric movements, was shown to me in a cage, having entered the cellar of a public-house, causing some diversion in the hunt for it among leaden pipes and ale-barrels.

May 9th.—Three pairs of Swifts wheeling around on the quay-side in a somewhat unsettled manner; an old-time haunt of theirs having been effectually done away with last year, they seem at a loss where to settle. They eventually, with other arrivals, distributed themselves around in various directions, one pair finding nesting quarters in quite a new house.

On May 11th, the atmosphere being warm and heavy, insects flew low, many falling into the water, and were drifted by the tide on to the mud, to the delight of a number of Starlings and other foraging insect-loving birds. *Bibio marci* was greatly in evidence, and there were myriads of those other smaller Diptera which prove such a nuisance to painters. I myself was greatly annoyed by the swarm that, drifted by the light air and maybe attracted by some aroma from my paint, smothered the sides of my freshly painted houseboat.

A high tide on May 19th drove all the small spring Waders from the flats. I had an unpleasant episode with a bull and some heifers on one marsh when on the track of a big

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flock of Ringed Plovers, whose gathering there had aroused my interest.

May 25th will be remembered by me as the day on which my new houseboat (Moorhen II.) made her first voyage across Breydon up the River Waveney, and also by the considerable number of Redshanks that this spring nested on the surrounding marshes. At every bend and from every marsh the sharp-winged birds sprang up, and with loud clamorous protest fussed around. The Bure marshes, undoubtedly becoming drier each year through improved drainage, are less and less peopled by nesting birds. Here they more than held their own. I estimated that there could not be less than one hundred pairs. A dozen birds would be excitedly clanging their call-notes above head at one time.

Sailing down stream in my punt in the quiet evening, I observed the "off-duty" birds bathing and feeding on the muddy edges showing up here and there as the ebb-tide left them bare. There was but the merest standing room, with their tails touching the reed-stems, and their bills in the soft ooze, their long sealing-wax-like legs reflecting lower still in the stream. Here they made quite sideway hits, as Duck do when beginning to bathe, and preened their feathers with wet mandibles. Those that fed evidently were seeking insect-life rather than crustacean. Here and there one alighted upon a gate-post or rail, and passed on remarks to his companions as to what he thought of me-- "clat-clat-clattering" most persistently. I would like to have known the purport of their clamour!

We do not get many Oystercatchers at Yarmouth, which is curious, considering their numbers on the flats and shores of the Wash. Of course, the vast areas of Mussels left exposed by the ebb-tide are an attraction there. I considered seeing three grand birds on the flats on May 28th worth noting. Six more on June 19th.

June 1st.—Several Common Sandpipers around Breydon. I have a strong suspicion that odd pairs nest in the county, although I have the record of but one nest being discovered under a gooseberry bush at Hickling on May 25th, 1897.

3rd.—Early this morning I was punting up Breydon when I heard the whirring sound produced by an aeroplane above head.

At first it did not occur to me whence the noise proceeded, and I put my glasses on to the Acle Road, imagining it to be caused by a motor-car. Then I noticed the curious evolutions of a large flock of mixed Gulls, mostly Greater Black-backed, that were circling and gyrating around each other, like so many whirligig beetles on a ditch, but ascending on each sweep. Then I observed the cause of their affright to be the passing over of a biplane, which they evidently imagined to be some huge bird of prey or ill omen; they kept circling around until the machine outdistanced them, when they descended again to the flats, holding confab with outstretched necks and many signs of uneasiness. They had scarcely recovered their equilibrium when the uncanny creature reappeared in sight, and the same uneasy evolutions were repeated. I expect that a little more familiarity will breed in them the proverbial contempt.

13th.—On this date I sailed across Breydon, putting up a couple of Common Scoters. This is a rather unusual record for this month.

Next day I was still more astonished to see no fewer than twenty Bernicle Geese pass over my head at St. Olave's (five miles from Breydon). They were spread out in extended line leading from N.W. to S.E.; the wind was S.E. So close were they to me that I might have thrown a stone far beyond them, and they passed so low that I could easily note the markings on the back and wings. On the following day an odd bird flew in the same direction.

I was greatly disappointed by a couple of Swallows on June 14th. They flew into the cabin of my houseboat twice, and on each occasion went round and round, inspecting the rafters, paying small attention to me. I hoped they would fix up a nest inside, but they were apparently dissatisfied; they went into an adjoining half-finished houseboat, dabbed on a few beakfuls of mud, and then abandoned that.

Greenfinches come to my bank-side, and greedily devour the flowering heads of the groundsel; local, "sanchen."

In a secluded lane, a short walk from my mooring-place, the Red-backed Shrikes nest annually. In June I found several aged and dead "thorns" on which they impaled their favourite prey—the common bumble-bee. One day they "jabbed"—I can call the action by no other name—a still living field-mouse, the thorn entering the throat and coming out at the back of the head. The "cinnabar" caterpillar abounded on the plentiful ragwort by hundreds: to these moths the Shrikes pay great attention. Later on I one day observed a young Shrike fly to the hedge-bottom and seize a belated caterpillar. It flew to an outstanding twig, knocked the curling larva two or three times sharply on the rough bark, and swallowed it.

The Red-hipped Bee swarmed the heather on a neighbouring common by thousands.

On one occasion, in June, I was watching a Greenfinch busy among the groundsel, when a sneaking Water-Vole arrested my attention as he slyly and with weasely cunning crept up through the covering grass, evidently endeavouring to get close to the bird. Whether he would really have attempted to seize the Greenfinch, I can only surmise; I know the rodent will devour a dead Roach. And the farmer hard by was emphatic in his assertion that the Voles once made off with some newly hatched chickens brought off in a hedgerow adjoining one of his ditches.

Night after night in July the hanger at the edge of the marsh was tenanted by Nightjars. They nested freely on the heathy common lands overlooking the Belton and St. Olave's marshes. Sitting on the limbs of an aged elm the male birds churned out their rattling notes in the gloaming. Their "music" reminded me greatly of the sound produced by a knife-grinder when busy with the emery wheel that is used after the rougher sharpening of a knife upon the sandstone wheel. It was odd to see them darting out and around with V-shaped flight, seizing the ghostly moths and droning beetles that circled about the trees. I noticed in showery weather these birds haunted belts of thick firs, under the sheltering branches of which the insects found tolerable hiding.

July 13th.—When watching a Kestrel hovering above a marsh hard by, I thought it seemed a considerable time making up its mind to drop, as it evidently saw something attractive below, when down it rushed, rising immediately with what I took to be a *dead* Short-tailed Field-Vole in its talons. In chatting with the farmer a few minutes after he assured me he had killed four Voles the previous day at the spot indicated. We strolled over to it, finding two of the dead "mice" still left there. It was a hot noonday, and the Voles, both gravid females, were as warm as if alive, and already thickly spotted with fly-blows. It is evident to me that the hawk must have had young ones, as its deigning to collect dead animals seemed to warrant. In confinement, of course, the bird will readily take anything edible offered it, whether dead or alive.

On Saturday, July 20th, a market gardener driving up to market stopped to hand me a parcel. On opening it I found two dead Weasels and three Water-Shrews (*Crossopus fodiens*), two of them adults, the other a young one. These had been found alive with the Weasels, and were together promptly killed. Three or four other Shrews already dead had been discovered when turning over a "cock" of rough marsh-hay.

25th.—Local-bred Wheatears seen around Breydon walls and marshes.

Very few Terns visited Breydon this summer, fewer than have been known for many years. As is well known, there are large and thriving colonies nesting at Blakeney, Cley, and Wells, at the northern extremity of the county. In fine warm summers it would seem that herring-syle, their chief food, is plentiful and easily procured in their own particular neighbourhood, whereas in untoward seasons it is evident rough weather has a tendency to cause the young herrings to swim deeply. Other things also may be taken into account—tidal, and so forth. Then, it would seem, the Terns (Little and Common) put in to Breydon. Last year they swarmed here, and were quite a feature in late July and during all August. Unfortunately in such seasons they invariably prolong their stay until the beginning of September, when shooting commences, and when many become targets for indiscriminate, cruelly-minded gunners. This season they undoubtedly performed their southerly movement later, and when they moved steadily passed southward. Their scarcity here has been much commented upon.

I visited Easton Broad, in Suffolk, during August. It and a smaller bit of water known as Covehithe Broad are somewhat inaccessible, secluded lakes, making a long journey from Lowestoft necessary, although, had I been so minded in making a long detour, I might have made the beach walk shorter, from Southwold. What seemed to me remarkable is their nearness to the sea. The smaller "lake" (Covehithe) had a well-defined channel scored in the intervening sand, showing how easily at high tides the sea gained access to it. The water was very brackish, almost salt, yet clumps of reed and rushes margined it. I found a few crustaceans of an eminently semi-marine kind. At Easton, a few yards farther from the sea, the water tasted quite fresh, and had the appearances characteristic of a freshwater Broad. It was crowded with Coots, and in all probability becomes a favourite resort of various wildfowl in the colder season.

A Wren had built a nest this year in a very curious position. A village blacksmith had strung together a lot of rusty old horseshoes; in the midst of this curious assortment a cosy nest had been built, and young hatched and reared.

August 28th. — Getting near the end of the close-season. Birds simply swarmed on Breydon. When taking a spin round in my punt, I saw ten Sheld-Ducks feeding upon the flats; quite two hundred and fifty Curlews, several Common Sandpipers, with many small shore-birds—Ringed Plovers, Whimbrel, Dunlins. As showing the dryness of the marshes for want of rain, a dozen Lapwings had joined themselves to the other Waders on the mud-flats—an unusual occurrence. A few Little Terns were present, one or two with still squeaking young clamouring for young herrings, which the old birds occasionally placed in their mandibles, at other times gave them the added excitement of making them pick them up after dropping them. Hundreds of Gulls, including a considerable number of Common Gulls.

On the 31st I saw a Spotted Shank, in company with a Redshank. It was extremely restless. I pushed my punt's nose into the edge of the grass-clad "Lumps," the last portion of the flats left uncovered. Here several Turnstones, a few Knots, a Curlew, and a few Dunlins slept away the hour in which all the softer muds were submerged.

On the last afternoon of my holiday (Sept. 1st) I eschewed Breydon, where the gunners (mostly amateurs) were popping at everything that had not been frightened off the flats in the morning. I took my blind bird-chum (B. Dye) a long round over the Bure-side marshes, also accompanied by a lady bird-lover. We tramped miles through the mist-dripping grasses that covered the river-wall sides and met at the apex, our boots and lower garments being saturated during our tramp. We put up a few Snipe from some moist corners, and startled a number of Common Sandpipers from the flints that margined the river-side of the wall (or embankment), and from muddy patches. But our quest—the Green Sandpiper—was sought in vain. We neither flushed one nor heard its shrill distinctive "tu-whit, tu-whit, tu-whit." For some years past this bird, once a regular and constant early autumnal visitor, has been becoming rarer. Yet, strange to say, when a "ditch-fying" year obtains (when the vegetation and silt choking the ditches are "thrown" to the sides above them), one can almost always depend upon seeing odd birds in July and August. They have to my knowledge, although very solitary in habit, been seen to collect rarely to the number of half a score in such easily to be inspected situations, the exposed larvæ and the insect-life attracted thither evidently tempting them. It *was* a wet, dreary afternoon. The very slugs had been tempted to an early ramble up the rough stems of the thistles, and the *nemoralis* snails were out in numbers.

Inspector Donnison informs me that the Seals in the Wash had been seen to copulate, and young were frequently born. Soles were a favourite prey; and that the Seals often sleep under water (!).

September 4th.—A "wave" of small migrants. All round the neighbourhood Redstarts, Willow-Wrens, Redbreasts, Wheatears, and Pied Flycatchers were in evidence. Our little "Park" swarmed with them. A puppy bustling into a clump of shrubs and undergrowth turned out quite seventy birds.

Harvest-Mice are fairly plentiful in the north-east corner of Suffolk. I had a nest, well hidden in a clump of barley, brought me on Sept. 6th. It was made of rather coarse dry grass-bents, reminding me very much of a wisped-up ball of gardener's "raffia." It was as large as a duck's egg, and apparently as innocent of a doorway.

7th.—Swarms of Common Sandpipers all round Breydon walls. Sitting down to watch a bird, I found ere long a colony of red ants objected to my near proximity. For an hour afterwards I had the time of my life! What irritating little beings!

Kingfishers catching large bluebottles from twigs overhanging a Belton ditch. They acted much after the fashion of a Spotted Flycatcher in springing off and returning again to the self-same perch.

Adult Gannet cast up on the beach on Sept. 8th.

One other Entry.—August 12th: The marshmen had been cutting down "rough stuff" (mostly reeds) on an extensive rond beside the Waveney. A northerly wind had driven up a big tide, and the stubbles stood in water, to the great discomfort of many insects thus left exposed to the mercy of the elements. Several Starlings that had been entomologising an hour before had retired to chatter upon the much verdure-splashed sails and railings. Their places were taken by a small flock of Black-headed Gulls, now wading after swimming and drowning insects; whilst a hundred or more Sand-Martins were busily engaged snapping up their unhappy prey struggling for very life upon the surface of the water. Not a solitary Sand-Martin of all this congregation hunted in the air, but were hawking only a few inches above water, constantly stopping in their flight to dip at beetle or fly, scooping it up most adroitly, the lower mandible only being wetted by the action. A few House-Martins had joined themselves to this flock, and were also most industriously a-gleaning.

MIGRATORY AND OTHER ORNITHOLOGICAL NOTES FROM LOWESTOFT.

By F. C. Cook.

The following observations were made in the neighbourhood of Lowestoft from June, 1912, to June, 1913:—

June 21st.—A nest of the Nightjar, containing one egg, was found on the Denes just north of the town.

August 10th.—Several large flocks of Sand-Martins flying along the shore southwards, and a flock of Tree-Sparrows was observed making southward, flying very high. Two Yellow Buntings were seen bullying an immature Red-backed Shrike.

12th.—A number of Pied Wagtails were observed.

17th.—A large number of Meadow-Pipits and four Wheatears appeared on the Denes; numbers of Common and Lesser Terns seen along the shore.

20th.—An arrival of Yellow Wagtails; over twenty seen on the Denes.

21st.—Most of the Yellow Wagtails have passed; only six seen. Great increase was noted in the number of Wheatears, Willow-Wrens, and Terns.

22nd.—A Whinchat and a Spotted Flycatcher arrived; also a large number of Meadow-Pipits. Twelve Wheatears seen.

25th.—Inrush of Pied and Yellow Wagtails; two flocks of Yellow Wagtails seen to drop in from the north. A great number of Swifts, Swallows, Sand- and House-Martins seen. Flock of six Ringed Plovers flying south.

During the severe storm of August 26th large numbers of House-Martins were seen clinging to the walls of the highest buildings facing the sea, the wind being from the west.

28th. — Four Wrynecks and three Pied Flycatchers had arrived, along with several Willow-Wrens, Whitethroats, and Wheatears. On this date Dr. C. B. Ticehurst observed a Barred Warbler.

Pied Flycatchers and Garden Warblers had arrived in numbers on the 29th; with them were two Red-backed Shrikes and a Wryneck. The number of these birds had decreased considerably on the 30th and 31st.

September 3rd.—A movement of Meadow-Pipits was noticed, several flocks being seen flying south, while a large number had dropped on to the Denes. Also on this date a flock of Goldcrests had arrived, and several flocks of Ringed Plovers were flying south along the shore.

4th.—Two Purple Sandpipers seen busily feeding on the weed-grown breakwaters. They were very tame and allowed a near approach; they stayed until the 9th.

7th.—A large flock of Mistle-Thrushes moving south, also a flock of Ringed Plovers. A large number of Meadow-Pipits and Pied Wagtails had dropped in, also a few Common Whitethroats, one Lesser Whitethroat, and a few Wheatears. An increase in the number of Song-Thrushes was noticed.

8th.—Large numbers of Swifts, Swallows, and House-Martins had gathered, and were hawking over the Denes. Linnets had increased considerably. Quite a number of Curlews were heard passing over the town at night.

12th.—Saw my first Snow-Bunting, which was very tame, feeding within a few inches of my feet. Meadow-Pipits, Larks, and Starlings had arrived in large numbers.

14th.—Still more Wheatears. The number of Sky-Larks had decreased, while Meadow-Pipits and Starlings were the same as on the 12th.

16th.—Mistle-Thrushes, Starlings, and Linnets were moving south in flocks. The majority of Wheatears had passed along. One Common Redstart seen. A flock of about one hundred Swallows and Martins wheeling over the Park. Greenfinches and Larks were seen moving south on 17th.

21st.—Cold east wind blowing; great decrease in number of birds. A large flock of House-Martins moving south, flying very high. Several Pied Wagtails moving south.

23rd.—Swallows, House-Martins, and Linnets moving south. Several Wheatears, a Lesser Whitethroat, and a Willow-Wren seen; also a few Greenfinches, Chaffinches, and Pied Wagtails.

24th.—A flock of Yellow Buntings moving south; also a flock of Greenfinches and several flocks of Linnets. A Grey Wagtail passed on the 25th.

28th.—A female Brambling, two Common Redstarts, two Willow-Wrens, a Lesser Whitethroat, and a few Wheatears seen on the Denes. Two Grey Wagtails and four Golden Plovers seen in a field near the sea.

29th.—Saw a belated Swift flying south; also several Swallows and House-Martins.

October 1st.—Several Greenland Wheatears were seen amongst numbers of Common Wheatears on the Denes. Swallows and House-Martins, Sky-Larks and Linnets, moving south in flocks. A flock of Tree-Sparrows seen flying north.

2nd.—Two flocks of Greenfinches moving south; also several flocks of Linnets. Four Goldfinches and a number of Goldcrests seen, and an increase in number of Yellow Buntings was noticed.

3rd.—Large numbers of Larks, Linnets, and Greenfinches flying south in flocks; also a flock of Tree-Sparrows flying south, very high. One female Reed-Bunting was seen.

5th.—Two Swifts and one Swallow seen flying south. Flocks of Linnets, Greenfinches, and Yellow Buntings flying south, while a large number of Tree-Sparrows were seen moving north. Four Hooded Crows observed.

7th.—Large numbers of Linnets, a few Greenfinches and Chaffinches, several Larks and Tree-Sparrows, and a flock of Mistle-Thrushes flying south. The same species were seen moving south on the 8th and 9th; also on the 9th two flocks of Larks were seen flying in from over the sea. One Swallow and a female Brambling seen.

13th.—Great movement of Linnets, Greenfinches, and Tree-Sparrows working south. A flock of House-Sparrows seen flying south; also a flock of Mistle-Thrushes. An increase of Robins and Blue Tits noticed. Four Redwings seen flying south, as were also a few Rooks.

15th and 16th.—Linnets, Greenfinches, and Tree-Sparrows were coasting south; also on the 16th three flocks of Mistle-Thrushes and two Redwings were moving south. A flock of Hooded Crows were seen coasting north, while a migrant flock of Rooks, Jackdaws, and Hooded Crows was seen in a field overlooking the sea.

22nd.—Six small flocks of Larks arrived from over the sea. A passing increase of Goldcrests was noticed. Mistle-Thrushes two flocks of House-Sparrows, and one flock of Tree-Sparrows moving south. Several Redwings were heard passing over the town at night, as they were also on the 23rd.

Half a gale of wind was blowing on the 28th, and no birds were moving. On the 29th and 30th the wind had eased, and Mistle-Thrushes, Linnets, Tree-Sparrows, Larks, and Greenfinches were coasting south. A large flock of Rooks and Jackdaws were seen passing south over the town.

November 3rd.—An immature Red-throated Diver was observed within a few yards of the shore. A flock of Starlings and a single Sky-Lark arrived in from sea. Linnets, Tree-Sparrows, and Starlings were moving south in small numbers on the 7th, 17th, and 27th; also on the 27th a flock of Lapwings came in from sea.

A Crab brought in by one of the Lowestoft trawlers on Dec. 21st was identified by Mr. Patterson as *Dromia vulgaris*. It had been taken in the vicinity of the Galloper Lightship.

During the heavy wind from W.N.W. on January 12th several flocks of Ducks and Waders were flying south along the shore, and a large flock of Starlings was observed passing over the town.

February 22nd.—I observed a flock of over forty Pied Wagtails feeding by the edge of a small piece of water at Covehithe.

25th.—A flock of Rooks flew steadily away out to sea, making south-east.

March 4th.—A single Rook was seen to fly quite away out to sea; a few minutes after two others followed; also a Hooded Crow, with two Rooks, flew away to sea for a short distance, but returned again. A movement of Finches was observed, several flocks coasting south, as they were also on the 16th.

8th.—Several Rooks were sitting on their nests at Reedham. Redwings and Waders were heard passing over the town at night.

11th.—A Wheatear was seen on the North Denes—an early arrival. Several flocks of Linnets and Chaffinches were moving south; Rooks and Hooded Crows were flying away to sea south-east in flocks, while several Hooded Crows were also leaving in ones and twos. For some time after these flocks of Corvines had departed and were quite out of sight, single birds kept returning to land again. It was invariably noticed that these shirkers had a feather or two missing from their wings, which was undoubtedly responsible for their being unable to undertake the journey.

12th.—A flock of Lapwings seen coasting along south, as were also a few Rooks and Hooded Crows, and a flock of Chaffinches. A large flock of Starlings flew in a north-east direction over the sea.

13th.—A large flock of Jackdaws seen flying east; on reaching the sea they wheeled round confusedly for a time, then split up into two flocks, the larger returning inland again, while the rest departed over the sea. Large flocks of Starlings and a few Linnets and Chaffinches were seen coasting north, and a flock of Sky-Larks flew out to sea in a north-east direction.

15th.—An increase was noted in the number of Pied Wagtails. A small flock of Rooks flew over the sea north-east, while Linnets and Chaffinches were coasting north; several flocks of the latter were also noticed moving south.

17th.—A Grey Wagtail was observed passing.

20th.—A great movement of Finches south was noted; the majority were Linnets, with a few Chaffinches and Greenfinches. This movement was also noted on the 21st.

23rd.—An increase of Pied Wagtails and Goldcrests was noticed. Rooks, Jackdaws, and Hooded Crows were departing out to sea in a north-easterly direction, while Linnets and Chaffinches were coasting along south.

24th.—At Benacre, 6 a.m., the following birds were seen moving:—Several large flocks of Rooks, among which were a few Hooded Crows and Jackdaws, branched out to sea north-east; a large number of Starlings taking the same course as Rooks; a large number of Linnets, a few Chaffinches, Tree-Sparrows, and Larks, all of which were coasting north. A large number of Redshanks and Wigeon were seen about the marsh-pools. Eight male Wheatears seen.

26th.—No defined movement of Finches was noted, though there were a number of Linnets and a few Chaffinches on the Denes. A few Meadow-Pipits seen.

29th.—A great movement of Chaffinches south along the Denes; I watched this passing (which was almost incessant) from 6.15 a.m. till 7.15 a.m., when it practically ceased. Some of the flocks contained over a hundred birds; they were flying very low. About this time large numbers of Chaffinches alighted on the fishing-boats out at sea, and several were brought into port. Stonechat's nest containing two eggs seen. Flock of Rooks flying south-east over sea; few Linnets coasting south; also two Ringed Dotterels.

30th.—Three Dunlins and two Ringed Plovers seen. Flocks of Chaffinches, Linnets, and Greenfinches coasting south, as were also several flocks of Rooks, Hooded Crows, and Jackdaws, several flocks of which were also flying out to sea; two flocks of Starlings flying east over the sea. Large numbers of Redwings and Curlews heard passing over town at night.

31st.—A Peregrine Falcon flying south. Movement of birds same as 30th. Redwings and Curlews were also heard at night.

April 1st.—Large numbers of Rooks and Jackdaws flying out to sea for a short distance, but returning again; there was a thick haze at the time. Starlings, Chaffinches, Linnets, Greenfinches, Tree-Sparrows, and Meadow-Pipits coasting south. A Ringed Plover on Denes. Large flock of Wood-Pigeons flying south.

2nd.—The movement of Rooks and Finches was a repetition of the 1st. A movement of Wood-Pigeons was noted; several flocks flying south, a few out to sea. Three flocks were seen flying north-west; these had apparently been coasting north, and had branched off north-west. Two Pied Wagtails flying south.

3rd.—A few Finches coasting south; few Starlings north.

5th.—Practically no movement of birds at all; the wind was north-east, very cold. I observed a Kestrel devouring its prey while hovering with its head to the wind; its prey was either small birds or field-mice.

8th.—A pair of Snow-Buntings which had frequented the Denes for some time had departed; the female had an injured leg. Three Wild Geese flying north. Few Linnets and Greenfinches coasting, some north and some south.

10th.—A Water-Rail brought to me, having struck the telegraph-wires. About this time one was taken on board a Lowestoft fishing-boat at sea, and Mr. Patterson records several at Yarmouth. Rooks and Finches were coasting north, as they were also on the 15th, when a Ring-Ouzel passed through.

17th.—Three Willow-Wrens and two Wheatears seen. Linnets and Chaffinches coasting south.

19th.—One Sand-Martin, one Swallow, and three Willow-Wrens seen.

20th.—Same Willow-Wrens seen. Large number of Linnets moving north.

21st. — A Cuckoo, one Swallow, and same Willow-Wrens seen. Several other Swallows also observed.

23rd.—A Black Redstart passed through; a few Wheatears and Swallows; same number of Willow-Wrens.

24th.—A Wryneck, one Common Whitethroat, one Nightingale (male) in breeding haunts, two Wheatears, and a few Swallows. There was no increase on the 25th, when a Cuckoo was seen going north.

28th.—Three House-Martins seen.

29th.—One Wood-Warbler, eight Common Whitethroats; Cuckoo heard; two Willow-Wrens, two Wheatears; few Swallows.

May 2nd.—Few Sand-Martins seen; same number of Whitethroats, Swallows, Willow-Wrens, Wheatears.

3rd.—A Cuckoo of the variety *C. rufus* was found on the roof of a house in the town; it had probably struck the telegraph-wires on the night previous, as it was still warm when found. The following birds I saw while cycling to Beccles:—Chiffchaff, Nightingale, Cuckoo, several Willow-Wrens; while on the river at Beccles I saw several Sedge-Warblers, few Ray's Wagtails, large number of Sand-Martins and Swallows; Snipe "drumming."

5th.—A male Red-backed Shrike, which when first seen was being bullied by two Willow-Wrens; nine Common Whitethroats; one Swallow and one House-Martin.

7th.—A slight decrease of Whitethroats. House-Martins building.

10th.—Four Swifts; two Lesser Whitethroats seen.

11th.—Large number of Swifts had arrived, and were circling round their old nesting places. Large number of Swallows seen.

12th.—Grasshopper-Warbler and Chiffchaff heard at Beccles.

16th.—A Hooded Crow seen going north along the shore. Red-backed Shrike seen.

18th.—Two Turtle-Doves flying north. No big increase of other migrants noticed during the remainder of the month.

NOTES ON RARE FISHES SOLD FOR FOOD IN EAST LONDON.

BY F. J. STUBBS.

DURING the rearrangement of the collections in the Whitechapel Museum (one of the Stepney Borough Museums), I commenced to prepare and exhibit a series of the food fishes on sale in East London, and, as a result of the attention paid to the subject, I am able to offer the following notes on the rarer and more interesting species. At first we purchased the material haphazard, generally from the barrows in the streets, but when our plans became known many of the dealers were good enough to retain for us any out-of-the-way specimens coming into their hands. Most of the stuff was procured in Wentworth Street, a picturesque market lying between Aldgate and Bishopsgate; the inhabitants of this quarter are almost entirely aliens, chiefly Continental Jews, and the foodstuffs displayed in the street are often quite foreign to English eyes.

Freshwater fish of nearly all kinds (excepting such as Burbot, Eels, or Lampreys) are greatly esteemed, and are sold at high prices. Salmon is constantly on sale in its season, and species like Bream or Pike, which do not appeal to the average British palate, are here highly valued. Indeed, so far as coarse fish are concerned, the demand is far in advance of the supply. The freshwater fish are brought from the Continent, either alive or in ice. A certain amount is of British origin, but the supply is erratic, for pisciculture is not a business that has taken root here. Deep-sea trawlers unloading at Billingsgate from Norway, the White Sea, the "Rockall Depression," and the Bay of Biscay are the source of most of the salt-water material. It is, however, next to impossible to ascertain the place of capture of particular specimens, and one can only form an opinion by the general aspect of the barrows on any one day—for example, a display of Torsk, Norway Haddock, and Forkbeard would suggest a northern origin, and a specimen of *Beryx* in this lot might be presumed to come from Norway rather than the coast of Portugal.

For a popular museum I hold coloured casts to be far preferable to either wet preparations or stuffed specimens. Described in a few words, our general method of preparation is as follows: The specimen is cleaned of mucus, and, if it has been gutted, stuffed with clay and sewn up. The fins are cut off and pinned out to dry, and the stripped body is covered with ordinary paraffin wax. Dental plaster is used for the cast. The expanded fins are carefully cemented in their exact positions, and appropriate glass eyes are fitted. Plaster, of course, will not take paint. Sometimes we impregnate with wax, but I prefer to "gild" with ordinary gold size and aluminium leaf.

At this stage the cast or model is an exact replica of the living fish, in bright aluminium, and it is then carefully coloured from a fresh specimen, or (in the case of rare species) from a drawing made before the cast was taken. I use ordinary best quality oil colours, and as little medium as possible; and it is sometimes not very difficult to colour a model so that it cannot be detected at a yard distance from a fresh specimen. Mr. A. J. Gear, who has always been most generous with advice, regularly turns out specimens that defy the most cautious visual scrutiny. He leans towards the use of *guanin* as a nacreous or silvery pigment, but it is a medium that I have not adequately tried.

It is, however, to my colleague, Mr. P. W. Horn, that we are most indebted, for his wide knowledge of fish and skilful handling in preparation have been invaluable in the building up of our curiously garnered collection. In the following notes I shall only treat of the more interesting species, and, except when the contrary is stated, the place of purchase will be understood to be Wentworth Street:—

PIKE PERCH (*Lucioperca sandra*).—This Continental freshwater fish is on sale throughout the winter, and is very popular.

BASS (*Labrax lupus*).—March.

GREATER WEEVER (*Trachinus draco*).—January. The local name is "Beever" (a change that may be explained by "Grimm's Law"), and it has a high reputation. Day ('British Fishes,' i.

80) states that it was sold in Whitechapel under the name of "Spitalfields Weaver." A police regulation at Boulogne, and elsewhere, commands that the dangerous poison spines be removed before the fish is brought to market. This is not done here. The eye of this beautiful fish is not often described; it is of a fine and lustrous crimson colour.

Piper (*Trigla lyra*).—Winter, but not common. The Red Gurnard (*T. cuculus*) and the Grey (*T. gurnardus*) are sold in great quantities.

Bergylt (*Sebastes norvegicus*). — This interesting northern species is often on sale in winter.

Beryx (*Beryx decadactylus*).—Winter, occasionally in large numbers, but I cannot learn the exact sources. Specimens of these brilliant fishes are now exhibited in most museums, often under the name *Beryx splendens*. I use the former name, for the first one I bought in London agreed exactly with the description and figure in Fries, Ekström, and Sundevall's work on Scandinavian Fishes. Here Prof. Smitt (i. 68) suggests that the two species are identical. There is a good figure of this non-British fish in Günther's accessible 'Study of Fishes,' p. 422. The colour is a peculiar transparent or translucent vermilion, most difficult to reproduce, although Mr. Gear has been very successful by the use of coloured wax.

The Beryx is strictly a deep-sea fish, living below the hundred fathoms line, and is stated to be absent from British waters, although the fishermen say that it is extraordinarily abundant in the Rockall Depression. This fish occurs in many parts of the world where the sea has a sufficient depth.

Braize (*Pagrus vulgaris*).—Another brilliantly coloured fish that occurs in December, March, and April. It is a southern fish, possibly from the Bay of Biscay.

Sea-Bream (*Pagellus centrodontus*).—I include this because it is the most popular fish in Wentworth Street. The name is "Bullseye," and the Bergylt, Beryx, and Braize, all red species with large eyes (the last has normal eyes), appear to be sold as Sea-Bream.

Scad (*Caranx trachurus*). — Summer, but only in small numbers.

Wolf Fish (*Anarrhichas lupus*). — Largely sold in East

London, direct from the dealers to the fried-fish shops. It is rarely or never displayed whole.

ANGLER (*Lophius piscatorius*).—Sold in the same way as its unbeautiful predecessor. Small specimens are sometimes to be procured entire.

IDE (*Leuciscus idus*).—This interesting species is of Continental origin so far as Wentworth Street is concerned, although it is on the list of British fishes. It is often on sale. The albino variety, better known as the "Golden Orfe," has twice appeared in Wentworth Street.

NÆSLING (*Chondrostoma nasus*). — A non-British freshwater fish that appears not uncommonly in January and February.

GARPIKE (*Rhamphistoma belone*).—Frequently on sale in spring.

POLLAN (*Coregonus pollan*).—February. Of Irish origin.

GRAYLING (*Thymallus vulgaris*).—A specimen weighing about two pounds, purchased in October, and said to be from Wiltshire, contained a specimen of an uncommon water Hemipteron (*Aphelocheirus æstivalis*).

SILE SMELT (*Argentina silus*).—In April, 1913, Mr. Hotine, of Leadenhall Market, sent a fish that was new to me, but by the help of Smitt's useful book I soon recognized it. The specimen was almost entirely devoid of scales, but those remaining were distinctly spiny; and the large eyes and the number of gill-rakers, together with the shape of the posterior margin of the operculum, pointed to nothing but *A. silus*. It was a foot in length. The species has already been recorded for British seas (Holt, Journal Marine Biol. Assoc., v. 341), but is best known as a northern fish.

TORSK (*Brosmius brosme*).—An uncommon winter fish.

LESSER LING (*Molva dipterygia*).—Mr. Horn has found this species both in Wentworth Street and Watney Street. It agrees exactly with the figure and description in Smitt's 'Scandinavian Fishes'; indeed, the great eyes, almost eel-like body, short barbel, and peculiar translucent appearance separate it immediately from *Molva molva*. The date for this non-British species was June.

GREATER FORKBEARD (*Phycis blennioides*).—Not common.

Macrurus rupestris (*Coryphænoides rupestris* of Day) (vol. i. 335, pl. xciii). — A specimen procured from Leadenhall was presented to us by Mr. Gear. One found by Mr. Horn in Wentworth Street seems to me to be *M. bairdii* (Goode and Bean, 'Oceanic Ichthyology,' 393, fig. 335).

Malacocephalus lævis (*Macrurus lævis*).—A specimen which I cannot trace was brought to the museum in 1907, and identified by the British Museum authorities. *M. cœlorhyncus* and *M. fabricii*, which are described and figured in Fries, Ekström, and Sundevall's work, might well be looked for in English markets. The members of this family are now known to be common deep-sea fishes.

WHIFF (*Arnoglossus megastoma*).—December to March.

VARIEGATED SOLE (*Solea variegata*).—We have secured one or two examples of this very distinct species.

LUMPSUCKER (*Cyclopterus lumpus*).—This picturesque animal is sometimes displayed as a sort of ornament on fish-stalls in East London. A 6-inch specimen brought to me was marked with tints that I can only describe as *pure* Prussian blue and *pure* crimson lake: an embarrassing combination of colours.

THE PHARYNGEAL TEETH OF FISHES.

By Colonel C. E. Shepherd (Indian Army).

(Continued from p. 146.)

Mullidæ.

Mullus barbatus (the Red Mullet). There are fifteen horny gill-rakers on the first cerato-hypobranchial arch, the last three being very minute, and five along its epibranchial; they all carry teeth. The inside of the first arch, both sides of the second and third arches, and the outer side of the fourth arch bear tubercles, those on the outer sides being much larger than those on the inner sides; the tubercles have teeth on them. They leave openings between them for water to pass to the gills. The upper pharyngeal teeth on the patch attached to the second epibranchial are cardiform, and markedly more prominent than those attached to the shields on the third and fourth epibranchials, the teeth on these being concealed in the mucous membrane that surrounds them. The lower pharyngeal teeth have several prominent cardiform teeth on their hinder margin, the teeth in the forward part being embedded in mucous membrane. Fig. I., 1.

Mullus surmuletus (the Surmullet, Couch) has seventeen horny gill-rakers on the first cerato-hypobranchial, with five on the first epibranchial. There are tubercles on the other arches, including the outer side of the fourth arch. The inside of the horny gill-rakers bear teeth, but none could be made out on the tubercles. The teeth on the pharyngeal bone attached to the second epibranchial are cardiform and prominent; the other teeth in the upper pharyngeals are also cardiform, but more embedded in mucous membrane. The lower pharyngeal teeth are rather more conical than cardiform; the catch of these is not so pronounced in the backward direction as cardiform teeth would give if a finger were drawn against them.

Trachinidæ.

Trachinus draco (the Greater Weever), on the outside of the first cerato-hypobranchial has fourteen horny gill-rakers, and seven along its epibranchial. They have a number of fine teeth on their inner faces; on the inner side of this arch there are longish tubercles, also covered with teeth. The second arch has much the same horny gill-rakers on its outer edge with teeth on them, and toothed tubercles on the inner side. Both sides of the third and the outer side of the fourth have toothed tubercles. The upper pharyngeals bear cardiform teeth thickly planted together, the points showing at the surface of the mucous membrane they are embedded in. Those growing on the bone attached to the second epibranchial show up more distinctly than the others. The lower pharyngeal teeth show as one broad patch across the floor of the mouth of cardiform teeth thickly matted together. Fig. I., 2.

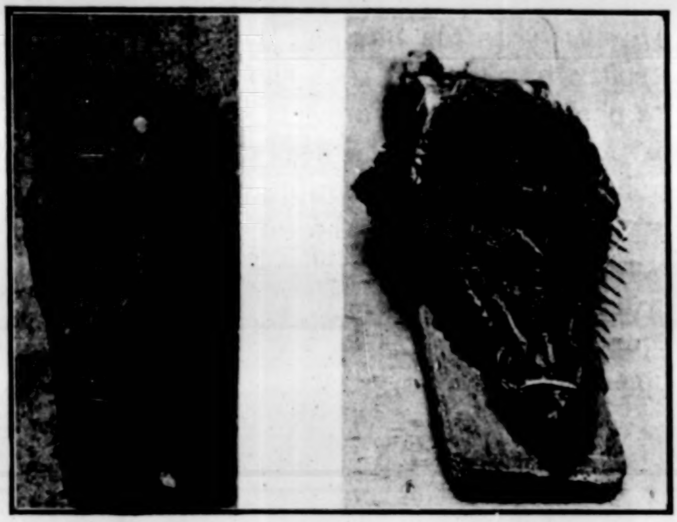

FIG. I.

1.—MULLUS BARBATUS. 2.—TRACHINUS DRACO.

Trachinus radiatus, a Mediterranean fish, has flat tubercular gill-rakers on the outer sides of the inner arches covered with minute teeth. The upper pharyngeal teeth are in two separate plates on each side, the upper one long and narrow, the lower one of a long oval shape; its lower margin stands away from the mucous membrane below it. The lower pharyngeal teeth are on two broad triangular patches, close together at the anterior apex, but diverging very much at the posterior end.

URANOSCOPIDÆ.

Uranoscopus scaber, a Mediterranean fish. The upper and lower pharyngeal teeth are cardiform. The upper ones are in a circular patch, from which a few project very visibly; the remainder are embedded in mucous membrane, with the points showing. In the lower pharyngeal teeth, those near the middle of the mouth are more distinct along the middle line; the others are smaller, but a finger drawn against them gives a notion of the grip they would take of any food in the act of swallowing.

CALLIONYMIDÆ.

Callionymus lyra (the Skulpin, also Dragonet), has short, smooth, soft gill-rakers on each side of its branchial arches. The upper pharyngeal teeth are set on two round shields; the uppermost one attached to the head of the second epibranchial arch can be easily moved, showing their separate condition. The pharyngeal teeth are cardiform and rather sparsely sown over the upper and lower pharyngeal bones on which they are set. Crustaceans form a part of the diet of this fish; a sand-hopper, one of the Amphipoda, was taken out of the gullet of the specimen examined.

BLENNIDÆ.

Blennius gattorugine, the "Gattorugine," Couch, who also says it is known as "Tompot" by fishermen in the West of England. It has seven stunted horny gill-rakers on the first cerato-hypobranchial. The other arches have them on the inside and outside, but distantly placed from each other, so that the filter made is not a very good one. The upper pharyngeal teeth, which are cardiform, are set in two curved rows on each side attached to the upper part of the third and fourth epibranchials. The lower pharyngeal teeth are in a row, each side forming a V, with its apex directed forward.

Blennius ocellaris (the Butterfly Blenny) has nine soft gill-rakers on the cerato-hypobranchial of the first arch that have fine bristles at the extremities of several of them; there are two gill-rakers on the epibranchial. The gill-rakers of the other arches are tubercles. The upper pharyngeal teeth arranged in one patch on each side, the upper portion of which has cardiform teeth placed in a curved row and standing up distinctly. The lower pharyngeal teeth are also cardiform; those along the forward end stand well up. Fig. II., 1.

Blennius sanguinolentus, a Mediterranean fish, has six upstanding but feeble-looking gill-rakers on the first cerato-hypobranchial arch. On the outer sides of the second, third, and fourth arches the gill-rakers look as if made of a fold of skin gathered into a series of pleats, but with a corner standing up. This seems to make a very efficient filter apparatus. The upper pharyngeal teeth consist of two rows of cardiform teeth, with the mucous membrane above them very prominent and soft and overlapping them.

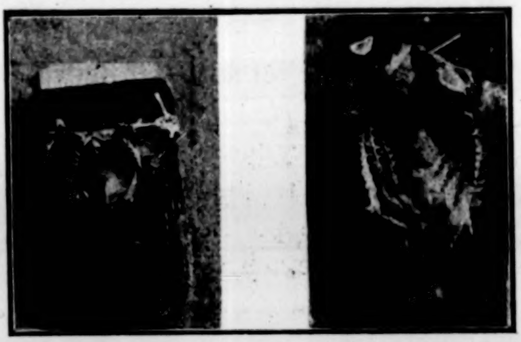

FIG. II.
1.—BLENNIUS OCELLARIS. 2.—GOBIUS CAPITO.

Anarrhichas lupus, called the "Wolf-fish" by Couch, who also gives "Cat-fish" as a name; the fishermen on the East Coast and Billingsgate dealers call it the "Cat-fish," from the resemblance of its head to that of a cat. This fish has fourteen short, thick, horny gill-rakers on the first cerato-hypobranchial arch, that do not come to a point at the extremity but which have two shoulders with a broad point protruding above them. There are four gill-rakers on the first epibranchial. The longest gill-raker on the first arch is only in length about one-fourth of the depth of the gill-lamina below it. The inner side of the first and both of the three other branchial arches, bearing gills, have very short outstanding gill-rakers. None of these gill-rakers are toothed. The upper pharyngeal teeth consist of a row of blunt conical teeth, slightly curved at the points on the head of the second, with a double row on the heads of the third and fourth epibranchials, which have also a half row on the lower portion. The lower pharyngeal teeth are also conical, stronger at the anterior end than at the posterior; they stand in three rows at the anterior, diminishing to two rows at the posterior end. The food of this fish consists of lobsters, crabs, and molluscs. The mouth was full of chewed-up food, and a small tooth-brush had to be used to clean the pharyngeal teeth before they could be well observed.

GOBIIDÆ.

Gobius capito has ten upstanding gill-rakers from the angle to the end of the first cerato-hypobranchial arch, with one only on its epibranchial. The inner side of the first arch has tubercle gill-rakers, as have also the other arches. Between the branchial arches these tubercles are alternate, but they do not make a very close filter. The upper pharyngeal teeth appear as one large circular patch of cardiform teeth, much embedded in mucous membrane so that only the points show; when felt with the finger they are very palpable. The lower pharyngeal teeth are also embedded in mucous membrane, and show even less than the upper ones do, but again they are very palpable to the finger. Fig. II., 2.

Gobius niger (the Rock Goby, Couch). The pharyngeal teeth in this fish are villiform.

Gobius microps and *G. minutus* (the Tail-Spotted Goby, Couch). Each of them has sharp little cardiform teeth for the upper and lower pharyngeal teeth. In the mouth of one of the latter a small Amphipod, generally known as a "sandhopper," was found.

SCORPÆNIDÆ.

Scorpæna scrofa, a Mediterranean fish. The gill-rakers are very short and far apart, one on the first cerato-hypobranchial arch, with four on the epibranchial; these all bear small teeth. On the inner side of the first arch there are six tubercles with small teeth on their summits. On the second and third branchial arches there are eight tubercles of a flattened dome shape on the outer side, and eight upstanding tubercles on the inner side, with three tubercles on the second epibranchial. The fourth arch has five flat dome-shaped tubercles. All these tubercles also are teeth-bearing. The upper pharyngeal teeth consist of a long narrow patch on the second epibranchial, an irregular oblong patch on the third epibranchial, with another narrow piece running down this epibranchial, and on the fourth epibranchial a roughly circular patch that has its lower margin projecting from the mucous lining of the back of the mouth. The lower pharyngeal teeth are arranged in a roughly diagonal patch. All the pharyngeal teeth are cardiform. Fig. III.

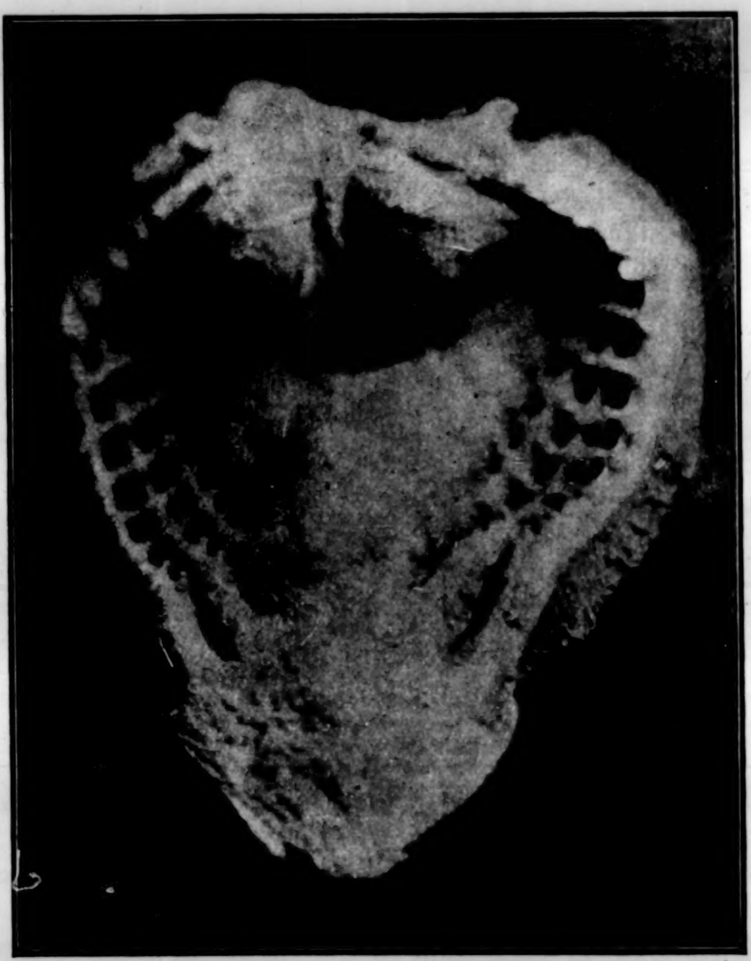

FIG. III.—SCORPÆNA SCROFA.

Sebastes imperialis, a Mediterranean fish. The upper and lower pharyngeal teeth are minute cardiform teeth. Fig. IV., 1.

BALISTIDÆ.

Balistes capriscus (the File-fish, also called "Trigger-fish") occasionally found in the South of England, plentiful in the Mediterranean, has twenty-four horny gill-rakers on the first cerato-hypobranchial arch, with five on the epibranchial part; on the other arches there are tubercles. The upper pharyngeal teeth are cardiform, and set far back in the pharynx. The lower pharyngeal teeth are a few cardiform teeth in the middle line of the floor of the gullet. This fish feeds on the coral insects and on Mollusca, which its powerful front teeth enable it to do. Fig. IV., 2.

Balistes erythrodon, from the Indian Ocean, has twenty-six horny gill-rakers on the first branchial arch from the angle to the end of the hypobranchial, and six on the first epibranchial. The other gill-rakers consist of tubercles, but not quite such pointed ones as in the next to be described fish. The upper pharyngeal teeth are cardiform and not very numerous. The lower pharyngeal teeth are in two rows on the margins of the lower pharyngeal bone; they are small, and can be felt better than seen.

Balistes niger, from the Indian Ocean, has twenty fine horny gill-rakers along the first cerato-hypobranchial, with eight along its epibranchial; the other arches carry tubercle gill-rakers of an elongated pointed shape that fit in alternately and form a very close filter. The pharyngeal teeth are cardiform, and set far back in the gullet.

CICHLIDÆ.

Cichlosoma bimaculatum (called the "Putwa" at Demerara) has five short, upstanding gill-rakers, the longest about one-fourth the depth of the gill-lamina below it, on the first cerato-hypobranchial arch, with one on the first epibranchial. There are gill-rakers on each side of the other arches. The upper pharyngeal teeth are in two small patches, speckled over with little brown teeth, on the heads of the third and fourth epibranchials. There are minute brown teeth for the lower pharyngeals, speckled over a triangular patch.

Crenicichla saxatilis, from British Guiana, has on the first cerato-hypobranchial arch seven short upstanding gill-rakers which bear teeth, with two on its epibranchial. The other arches have gill-rakers inside and outside. The upper pharyngeal teeth consist of an elongated patch, on the third epibranchial, of small teeth, and on the fourth a patch of strong conical teeth. The lower pharyngeals are in a triangular patch. The bones of the fifth arch are united.

Hemichromis bimaculatus, a Nile fish, has five gill-rakers on the first cerato-hypobranchial, with two on the epibranchial of the first arch. The upper and lower pharyngeal teeth are minute cardiform ones of a dark colour.

Tilapia nilotica, a Nile fish, has twenty-two soft but upstanding gill-rakers on the cerato-hypobranchial part of the first arch, with six on its epibranchial. The inside of the first arch and both sides of the other arches have gill-rakers that fit in opposite to each other so closely as to make a very efficient filter. The upper pharyngeal teeth are placed in two oval-shaped shields on each side, and are cardiform teeth of a blackish brown colour, the multiplicity of fine points giving the whole shield of teeth a dusky hue. The lower pharyngeal teeth are in a triangular patch across the whole floor of the gullet just in front of the œsophagus, with no median division ; the dark colour, however, is not so marked as in the upper pharyngeal teeth, those toward the forward apex merging into white. The base of the tongue and the mucous surface of the basibranchials is worked with corrugations in pattern like the veining of some leaf. Fig. IV., 3.

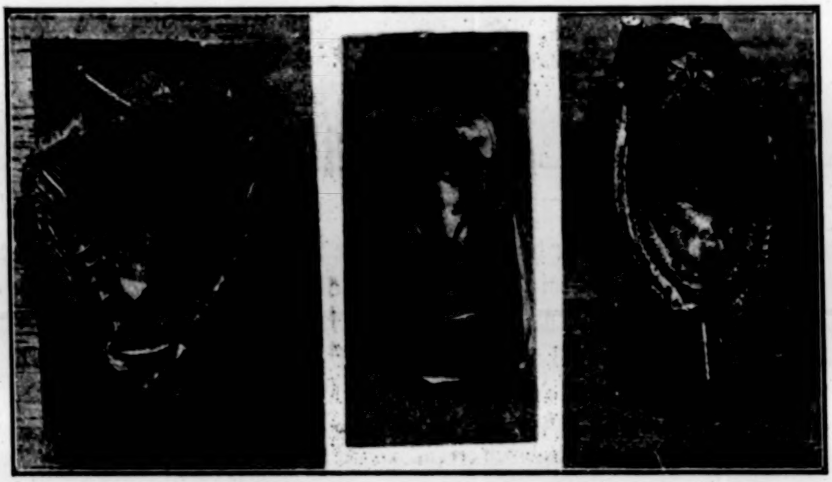

FIG. IV.

1.—SEBASTES IMPERIALIS. 2.—BALISTES CAPRISCUS. 3.—TILAPIA NILOTICA.

(To be continued.)

NOTES AND QUERIES.

MAMMALIA.

Rats and their Parasites.—I am trying to make a list of the parasitic Acari found on Rats (*Epimys norvegicus*, *E. rattus*, and *E. alexandrinus*) in this country, and would be very grateful for any specimens of these rodents for examination. If the bodies of Rats are placed in a tin with a closely fitting lid as soon as possible after death and sent at once by post their parasites will survive the journey. Even one or two specimens from a single locality are useful.—Stanley Hirst (British Museum (Nat. Hist.), Cromwell Road, London, S.W.).

AVES.

Status of the Starling.—This year we have not had such vast flocks of young Starlings in June as compared with recent years, which is somewhat strange, as this species has multiplied enormously of late years. I had an old friend, who died recently, who used to tell me he remembered quite well the first pair of Starlings breeding in Wilsden; and, writing to Mr. Harvie Brown in 1894, the late Duke of Argyll said: "I never saw a Starling till I went to England in 1836. I still recollect the great interest with which I saw the bird for the first time at the posting inn at Northallerton, in Yorkshire." Yet Jenyns's 'Manual of British Vertebrate Animals,' which was published in 1835, states that this species was plentiful and widely dispersed. Since the sixties there is no doubt but that it has been steadily increasing in numbers. It would be interesting to have it established on incontestable evidence that the Starling was unknown in many parts of Yorkshire previous to 1830. — E. P. Butterfield (Wilsden).

The Grey Lag Goose in Cumberland.—In 'The Zoologist' (*ante*, p. 346) I was surprised to see Mr. Bolam's statement that "the occurrence of *Anser cinereus* in any of the northern counties of England is always sufficiently rare at any season to make it worth putting on record." On the Cumberland Solway Marshes this species is now plentiful throughout the winter months.—Eric B. Dunlop (The Howe, Troutbeck, Windermere).

Notes from Wilsden.—Recently a Cuckoo's egg was found in the nest of a Ring-Ouzel on the moor above Bingley, which is a very rare occurrence here. The only other instance I have known I reported over twenty years ago; in this case the egg was found by two of my sons in a nest on Harden Moor. Also the egg of the Cuckoo has been found in the nest of a Robin a few miles from this village—another rare occurrence in the North-west Riding of Yorkshire. A male Pied Flycatcher took up its quarters for a short time in May in a likely nesting part of Bingley Wood, but ultimately left, I presume for a more suitable breeding haunt; but a more ideal breeding place than one or two places in Bingley Wood, from the human standpoint, it would be difficult to find for this species. It is gratifying to report again the nesting of the Hawfinch. — E. P. BUTTERFIELD (Wilsden).

INSECTA.

A Little-known Dipterous Parasite.—On coming downstairs on Aug. 16th, I saw a small Dipteron (*Simulium ornatum*) on the window-pane, and this insect seemed to enjoy its usual activity until a drop of benzine proved fatal. I then mounted it on a slip of cardboard, when what seemed a huge cabbage-green snake-like creature suddenly crept forth from its abdomen. Its dorsal side was incised like that of a *Julus*, and its head had some resemblance to a finger-nail. I do not recall having seen any notice of this parasite, but someone may have been more fortunate. After much wriggling the parasite attacked the thorax of the dead insect.—A. H. SWINTON (Braishfield, Romsey, Hampshire).

[I procured the *Simulium* and parasite from Mr. Swinton, and took them to the British Museum, where I sought the advice of a well-known dipterist, Mr. F. W. Edwards, who has kindly contributed the following note. Mr. H. A. Baylis has written on the identity of the parasite.—ED.]

"The worm described by Mr. Swinton probably belongs to the Nematode family *Mermithidæ*, the members of which parasitise a great variety of insects both in the larval and imaginal stages. Siebold (Stett. entom. Zeit. 1848, p. 299) and Strickland (Biol. Bull. Woods Hole, Mass., 1911) record species of *Mermis* occurring in the larvæ of *Simulium reptans* and *S. hirtipes* respectively, but Strickland (p. 326, *op. cit.*) states that "the *Mermis* does not affect the larval development to any extent, except by slightly increasing its size, but it inhibits the development of the histoblasts to such an extent that pupation becomes impossible." Some species of *Mermis*, however, apparently attack all the stages of their host, *e. g. M. albicans*, which is said by Miall and Hammond ('The Harlequin-fly,' p. 6, 1900) to infest the larva, pupa, and imago of *Chironomus*. I have been unable to trace any reference to a species of *Mermis* or *Gordius* having been recorded from an adult *Simulium*, nor can I find that any of these worms have been described as being green, whitish being the usual colour."—F. W. Edwards (British Museum (Nat. Hist.)).

"The small Nematode from the body cavity of *Simulium* answers closely to the description given by Siebold (in Stett. entom. Zeit. 1848, p. 299) of a species from the larva of *Simulium reptans*. The description is very meagre, but I see no reason to think we have got a different species here. If this is correct, the species would be *Mermis Simuliæ reptantis*, Sieb."—H. A. Baylis (Brit. Mus.).

NOTICES OF NEW BOOKS.

The British Parasitic Copepoda. By Thomas Scott, LL.D., F.L.S., and Andrew Scott, A.L.S. 2 vols. Ray Society. Dulau & Co., Ltd.

'A Monograph of the Free and Semi-Parasitic Copepoda,' by Dr. G. S. Brady, was published by the Ray Society in 1878–1880, but from this work those found parasitic on fishes were expressly omitted. "The present Monograph is the result of an endeavour to enumerate and describe the species which Dr. Brady has excluded, and may therefore be regarded as supplementary to that author's work." Dr. Baird's work on 'The Natural History of the British Entomostraca,' published by the Ray Society in 1850, recorded thirty-four species of Copepoda as parasitic on British fishes; the number is now increased to one hundred and thirteen. The enumeration and descriptions are given in a very careful and thorough manner, while the second volume is devoted to illustrations, mostly coloured, which provide the material for no fewer than seventy-two plates. British naturalists may well welcome such a guide and addition to their scanty knowledge on these obscure and little-known creatures.

A Bibliography of the Tunicata, 1469–1910. By John Hopkinson, F.L.S., F.G.S., F.Z.S. Ray Society. Dulau & Co., Ltd.

A bibliography on a special branch of zoology is one of the most cherished possessions in a naturalist's library. It makes so much possible; it enables and incites us to study first hand many old and some more modern treatises which we scarcely retained in memory, so generously are we now provided with up-to-date publications. But scattered in these older writings are often to be found the germs of many modern theories and conclusions, as well as observations and facts which have not always filtered down in our modern literature, though sometimes well known, but scarcely attributed to their original promulgators. This Bibliography has evidently been a work of love to Mr. Hopkinson, for such a compilation can never be adequately made in a perfunctory manner; it is a labour only achieved by personal inspiration and impulse. Among students of the Tunicata this book will be what Hagen's 'Bibliotheca Entomologica' is to entomologists.

Pond Life. By Rev. Charles A. Hall, F.R.M.S. Adam & Charles Black.

A knowledge of natural history often bears an inverse ratio to the extent of the area over which it is studied. Long journeys frequently only provide desultory study; one goes to find certain things and others are unnoticed. How few of us really know the flora and fauna of our own gardens? and it takes a good naturalist to do so. This little book confines its description to the plant and animal life to be found in and on the banks of a pond, accepting that word in its larger significance. Years of work and observation may be expended on such a quest, and many problems will have to be answered before we can pretend to know "pond-life"; nor could such a small book serve to be anything but an introduction to the subject. Volumes might be written on such an apparently small theme, for to know the great is to know the little. Mr. Hall has written an excellent and interesting book for the young student or general reader, and it may surprise many to learn the mass of living creatures, both plant and animal, that may be studied almost just outside their own doors.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, BIRMINGHAM, 1913.

ADDRESS TO THE ZOOLOGICAL SECTION.

By H. F. Gadow, M.A., Ph.D., F.R.S., *President of the Section.*

(Concluded from p. 360.)

Categories of Homoplasy.

Isotely.—If the character, feature, or organ has been evolved out of homologous parts or material, as is most likely the case in closely related groups, and if the subsequent modifications proceed by close resemblance. *Iso-tely*: the same mark has been hit.

Homœotely.—Although the feature has been evolved from homologous parts or material, the subsequent modifications may proceed by similar stages and means, there is a fair probability or chance of very different stages and means, and the ultimate resemblance will be less close, and deficient in detail. Such cases are most likely to happen between groups of less close affinity, whether separated by distance or by time. *Homœo-tely*: the same end has been fairly well attained. The target has been hit, but not the mark.

Parately.—The feature has been evolved from parts and material so different that there is scarcely any or no relationship. The resulting resemblance will at best be more or less superficial; sometimes a sham, although appealing to our fancy. *Para-tely*: the neighbouring target has been hit.

Examples.

Isotely; Bill of the *Ardeidæ Balæniceps* (Africa) and *Cancroma* (Tropical America).

Zygodactyle foot of *Cuckoos*, *Parrots*, *Woodpeckers* $\left(\frac{2.3}{1\cdot4}\right)$.

Patterns and coloration of *Elaps* and other snakes.

Parachute of *Petaurus* (marsupial); *Pteromys* (rodent) and *Galeopithecus*.

Perissodactylism of *Litopterna* and Hippoids.

Bulla auris of *Plioplatecarpus* (*Pythonomorphe*) and certain Whales; if tympanic = quadrate.

Grasping instruments or nippers in Arthropods: pedipalps of *Phryne*; chelæ of Squill; first pair of Mantis' legs.

General appearance of Moles and *Notoryctes*, if both considered as mammals; of Gulls and Petrels, if considered as birds.

Homœotely: Heterodactyle foot of Trogons $\left(\frac{3\cdot4}{2\cdot1}\right)$.

Jumping foot of *Macropus*, *Dipus*, *Tarsius*.

Intertarsal and cruro-tarsal joint.

Fusion and elongation of the three middle metarsals of *Dipus* and *Rhea*.

Paddles of Ichthyosaurs. Turtles, Whales, Penguins.

"Wings" of Pterosaurs and Bats.
Long flexible bill of *Apteryx* and Snipes.
Proteroglyph dentition of Cobras and Solenoglyph dentition of Vipers.
Loss of the shell of *Limax* and *Aplysia*.
Complex molar pattern of Horse and Cow.

Parately: Bivalve shell of Brachiopods and Lamellibranchs.
Stretcher-sesamoid bone of Pterodactyls (radial carpal); of Flying Squirrels (on pisiform); of *Anomalurus* (on olecranon).
Bulla auris of Pythonomorph (quadrate) and Whale (tympanic); is *incus* = quadrate.
"Wings" of Pterosaurs, or Bats, and Birds.

The distinction between these three categories must be vague because that between homology and analogy is also arbitrary, depending upon the standpoint of comparison. As lateral outgrowths of vertebræ all ribs are homogenes, but if there are at least hæmal and pleural ribs then those organs are not homologous even within the class of fishes. If we trace a common origin far enough back we arrive near bedrock with the germinal layers. So there are specific, generic, ordinal, &c., homoplasies. The potentiality of resemblance increases with the kinship of the material.

Bateson, in his study of Homœosis, has rightly made the solemn quotation: "There is the flesh of fishes . . birds . . . beasts, &c." Their flesh will not and cannot react in exactly the same way under otherwise precisely the same conditions, since each kind of flesh is already biased, encumbered by inheritances. If a certain resemblance between a reptile and mammal dates from Permian times, it may be homogenous, like the pentadactyle limb which as such has persisted: but if that resemblance has first appeared in the Cretaceous period it is Homoplastic, because it was brought about long after the class division. To cases within the same order we give the benefit of the doubt more readily than if the resemblance concerned members of two orders, and between the phyla we rightly seek no connection. However, so strongly is our mode of thinking influenced by the principle of descent that, if the same feature happen to crop up in more than two orders, we are biased against Homoplasy.

The readiness with which certain Homoplasies appear in related groups seems to be responsible for the confounding of the potentiality of convergent adaptation with a latent disposition, as if such cases of Homoplasy were a kind of temporarily deferred repetition, *i.e.* after all due to inheritance. This view instances certain recurring tooth patterns, which, developing in the embryonic teeth, are said not to be due to active adaptation or acquisition but to selection of accomplished variations, because it is held inconceivable that use, food, &c., should act upon a finished tooth. It is not so very difficult to approach the solution of this apparently contradictory problem. Teeth, like feathers, can be influenced long before they are ready by the life experiences of their predecessors. A very potent factor in the evolution of Homoplasies is correlation, which is sympathy, just as inheritance is reminiscence. The introduction of a single new feature may affect the whole organism profoundly, and one serious case of

Isotely may arouse unsuspected correlations and thus bring ever so many more homoplasies in its wake.

Function is always present in living matter; is its life. It is function which not only shapes but creates the organ or suppresses it, being indeed at bottom a kind of reaction upon some stimulus, which stimuli are ultimately all fundamental, elementary forces, therefore few in number. That is a reason why Nature seems to have but few resources for meeting given "requirements"—to use an everyday expression which really puts the cart before the horse. This paucity of resources shows itself in the repetition of the same organs in the most different phyla. The eye has been invented dozens of times. Light, a part of the environment, has been the first stimulus. The principle remains the same in the various eyes; where light found a suitably reacting material a particular evolution was set going, often round about, or topsy-turvy, implying amendments; still, the result was an eye. In advanced cases a scientifically constructed dark chamber with lens, screen, shutters, and other adjustments. The detail may be unimportant, since in the various eyes different contrivances are resorted to.

Provided the material is suitable, plastic, amenable to prevailing environmental or constitutional forces, it makes no difference what part of an organism is utilised to supply the requirements of function. You cannot make a silk purse out of a sow's ear, but you can make a purse, and that is the important point. The first and most obvious cause is function, which itself may arise as an incidental action due to the nature of the material. The oxydising of the blood is such a case, and respiratory organs have been made out of whatever parts invite osmotic contact of the blood with air or water. It does not matter whether respiration is carried on by ecto- or by endodermal epithelium. Thus are developed internal gills, or lungs, both of which may be considered as referable to pharyngeal pouches: but where the outer skin has become suitably osmotic, as in the naked Amphibia, it may evolve external gills. Nay, the whole surface of the body may become so osmotic that both lungs and gills are suppressed, and the creature breathes in a most pseudo-primitive fashion. This arrangement, more or less advanced, occurs in many Urodeles, both American and European, belonging to several subfamilies, but not in every species of the various genera. It is therefore a case of apparently recent Isotely.

There is no prejudice in the making of a new organ except in so far that every organism is conservative, clinging to what it or its ancestors have learnt or acquired, which it therefore seeks to recapitulate. Thus in the vertebrata the customary place for respiratory organs is the pharyngeal region. Every organism, of course, has an enormous back history; it may have had to use every part in every conceivable way, and it may thereby have been trained to such an extent as to yield almost at once, like a bridle-wise horse, to some new stimulus, and thus initiate an organ straight to the point.

Considering that organs put to the same use are so very often the result of analogous adaptation, homoplasts with or without affinity of descent, are we not justified in accusing morphology of having made rather too much of the organs as units, as if they were concrete instead of inducted abstract notions? An organ which changes its function may become a unit so different as to require a new definition. And two originally different organs may come to resemble each other so much in function and structure that they acquire the same definition as one new unit. To avoid this dilemma the morphologist has, of course, introduced the differential of descent, whether homologous or analogous, into his diagnoses of organs.

The same principles must apply to the classification of the animals. To group the various representative owners of cases of isotely together under one name, simply because they have lost those characters which distinguished their ancestors, would be subversive of phyletic research. It is of the utmost significance that such "convergences" (rather "mergers," to use an administrative term) do take place, but that is another question. If it could be shown that elephants in a restricted sense have been evolved independently from two stems of family rank, the convergent terminals must not be named *Elephantinæ*, nor can the representatives of successive stages or horizons of a monophyletic family be designated and lumped together as subfamilies. And yet something like this practice has been adopted from Cope by experienced zoologists with a complete disregard of history, which is an inalienable and important element in our science.

This procedure is no sounder than would be the sorting of our Cartwrights, Smiths, and Bakers of sorts into as many natural families. It would be subversive of classification, the aim of which is the sorting of a chaos into order. We must not upset the well-defined relative meaning of the classificatory terms which have become well-established conceptions; but what such an assembly as the terminal elephants should be called is a new question, the urgency of which will soon become acute. It applies at least to assemblies of specific, generic, and family rank, for each of which grades a new term, implying the principle of convergence, will have to be invented. In some cases geographical terms may be an additional criterion. Such terms will be not only most convenient, but they will at once act as a warning not to use the component species for certain purposes. There is, for instance, the case of *Typhlops braminus*, mentioned at the beginning of this Address. Another case is the dog species, called *Canis familiaris*, about which it is now the opinion of the best authorities that the American dogs of sorts are the descendants of the Coyote, while some Indian dogs are descendants of a jackal, and others again are traceable to some wolf. The "dog," a definable conception, has been invented many times, and in different countries and out of different material. It is an association of converged heterogeneous units. We have but a smile for those who class whales with fishes, or the blindworm with the snakes; not to confound the Amphibian Cœcilians with Reptilian *Amphisbænas* requires some training; but what are we to do with creatures who have lost or assimilated all those differential characters which we have got used to rely upon?

In a homogeneous crowd of people we are attracted by their little differences, taking their really important agreements for granted; in a compound crowd we at once sort the people according to their really unimportant resemblances. That is human nature.

The terms "convergence" and "parallelism" are convenient if taken with a generous pinch of salt. Some authors hold that these terms are but imperfect similes, because two originally different organs can never converge into one identical point, still less can their owners whose acquired resemblance depresses the balance of all their other characters. For instance, no lizard can become a snake, in spite of ever so many additional snake-like acqusitions, each of which finds a parallel, an analogy in the snakes. Some zoologists therefore prefer contrasting only parallelism and divergence. A few examples may illustrate the justification of the three terms. If out of ten very similar black-haired people only two become white by the usual process, while the others retain their colour, then these two diverge from the rest; but they do not, by the acquisition of the same new feature, become more alike each other than they were before. Only with reference to the rest do they seem to liken as they pass from black through grey to white, our mental process being biased by the more and more emphasized difference from the majority.

10	Ax	Bx	Cx	D	E	F
9						
8						
7						
6						
5						
4						
3						
2	Ax	Bx				
1	A	B	C	D	E	F

Supposing A and B both acquire the character X and this continues through the next ten generations, while in the descendants of C the same character is invented in the tenth generation, and whilst the descendants of D, E, F still remain unaltered. Then we should be strongly inclined, not only to "key together" $C_{\frac{x}{10}}$ with $A_{\frac{x}{10}}$ and $B_{\frac{x}{10}}$, but take this case for one of convergence, although it is really one of parallelism. If it did not sound so contradictory, it might be called parallel divergence. The inventors diverge from the majority in the same direction: Isotely.

Third case.—Ten people, contemporaries, are alike but for the black or red hair. Black A turns white and Red E turns white, not through exactly identical stages, since E will pass through a reddish grey tinge. But the result is that A and E become actually more like each other than they were before. They *converge*, although they have gone in for exactly the same divergence with reference to the majority.

In all three cases the variations begin by divergence from the majority, but we can well imagine that all the members of a homogeneous lot change orthogenetically (this term has been translated into the far less expressive "rectigrade") in one direction, and if there be no lagging behind, they all reach precisely the same end. This would be a case of transmutation (true mutations in Waagen's and Scott's sense), producing new species without thereby increasing their number, whilst divergence always implies, at least potentially, increase of species, genera, families, &c.

If for argument's sake the mutations pass through the colours of the spectrum, and if each colour be deemed sufficient to designate a species, then, if all the tenth generations have changed from green to yellow and those of the twentieth generation from yellow to red, the final number of species would be the same. And even if some lagged behind, or remained stationary, these epistatic species (Eimer) are produced by a process which is not the same as that of divergence or variation in the usual sense.

The two primary factors of evolution are Environment and Heredity. Environment is absolutely inseparable from any existing organism, which therefore must react (Adaptation) and at least some of these results gain enough momentum to be carried into the next generation (Heredity).

The life of an organism, with all its experiments and doings, is its Ontogeny, which may therefore be called the subject of Evolution, but not a factor. Nor is Selection a primary and necessary factor, since, being destructive, it invents nothing. It accounts, for instance, for the composition of the present fauna, but has not made its components. A subtle scholastic insinuation lurks in the plain statement that by ruthless elimination a black flock of pigeons can be produced, even that thereby the individuals have been made black. (But of course the breeder has thereby not invented the black pigment.)

There can be no evolution, progress, without response to stimulus, be this environmental or constitutional, *i. e.* depending upon the composition and the correlated working of the various parts within the organism. Natural selection has but to favour this plasticity, by cutting out the non-yielding material, and through inheritance the adaptive material will be brought to such a state of plasticity that it is ready to yield to the spur of the moment, and the foundation of the same new organs will thereby be laid, whenever the same necessity calls for them. Here is a dilemma. On the one hand the organism benefits from the ancestral experience, on the other there applies to it de Rosa's law of the reduction of variability, which narrows the chances of change into fewer directions. But in these few the changes will proceed all the quicker and farther. Thus progress is assured, even Hypertely, which may be rendered by "over-doing a good thing."

Progress really proceeds by mutations, spoken of before, orthogenesis, and it would take place without selection and without necessarily benefiting the organism. It would be mere presumption that the seven-gilled shark is worse off than its six- or five-gilled relations; or to imagine that the newt with double trunk-veins suffers from this arrangement, which morphologically is undoubtedly inferior to the unpaired, azygous, &c., modifications. The fact that newts exist is proof that they are efficient in their way. Such orthogenetic changes are as predictable in their results as the river which tends to shorten its course to the direct line from its head waters to the sea. That is the rivers Entelechy and no more due to purpose or design than is the series of improvements from the many gill-bearing partitions of a shark to the fewer, and more highly finished comb-shaped gills of a Teleostean fish.

The success of adaptation, as measured by the morphological grade of perfection reached by an organ, seems to depend upon the phyletic age of the animal when it was first subjected to these "temptations." The younger the group, the higher is likely to be the perfection of an organic system, organ, or detail. This is not a platitude. The perfection attained does not depend merely upon the length of time available for the evolution of an organ. A recent Teleostean has had an infinitely longer time as a fish than a reptile, and this had a longer time than a mammal, and yet the same problem is solved in a neater, we might say in a more scientifically correct, way by a mammal than by a reptile, and the reptile in turn shows an advance in every detail in comparison with an amphibian, and so forth.

A few examples will suffice:—

The claws of reptiles and those of mammals; there are none in the amphibians, although some seem to want them badly, like the African frog *Gampsosteonyx*, but its cat-like claws, instead of being horny sheaths, are made out of the sharpened phalangeal bones which perforate the skin.

The simple contrivance of the rhinocerotic horn, introduced in Oligocene times, compared with the antlers of Miocene *Cervicornia* and these with the response made by the latest of Ruminants, the hollow-horned antelopes and cattle. The heel-joint; unless still generalised, it tends to become intertarsal (attempted in some Lizards, pronounced in some Dinosaurs and in the Birds) by fusion of the bones of the tarsus with those above and below, so that the tarsals act like epiphysial pads. Only in mammals epiphyses are universal. Tibia and fibula having their own, the pronounced joint is cruro-tarsal and all the tarsals could be used for a very compact, yet non-rigid arrangement. The advantage of a cap, not merely the introduction of a separate pad, is well recognized in engineering.

Why is it that mammalian material can produce what is denied to the lower classes? In other words, why are there still lower and middle classes? Why have they not all by this time reached the same grade of perfection? Why not indeed, unless because every new group is less hampered by tradition, much of which must be discarded with the new departure; and some of its energy is set free to follow up this new course, straight, with ever growing results, until in its turn this becomes an old rut out of which a new jolt leads once more into fresh fields.

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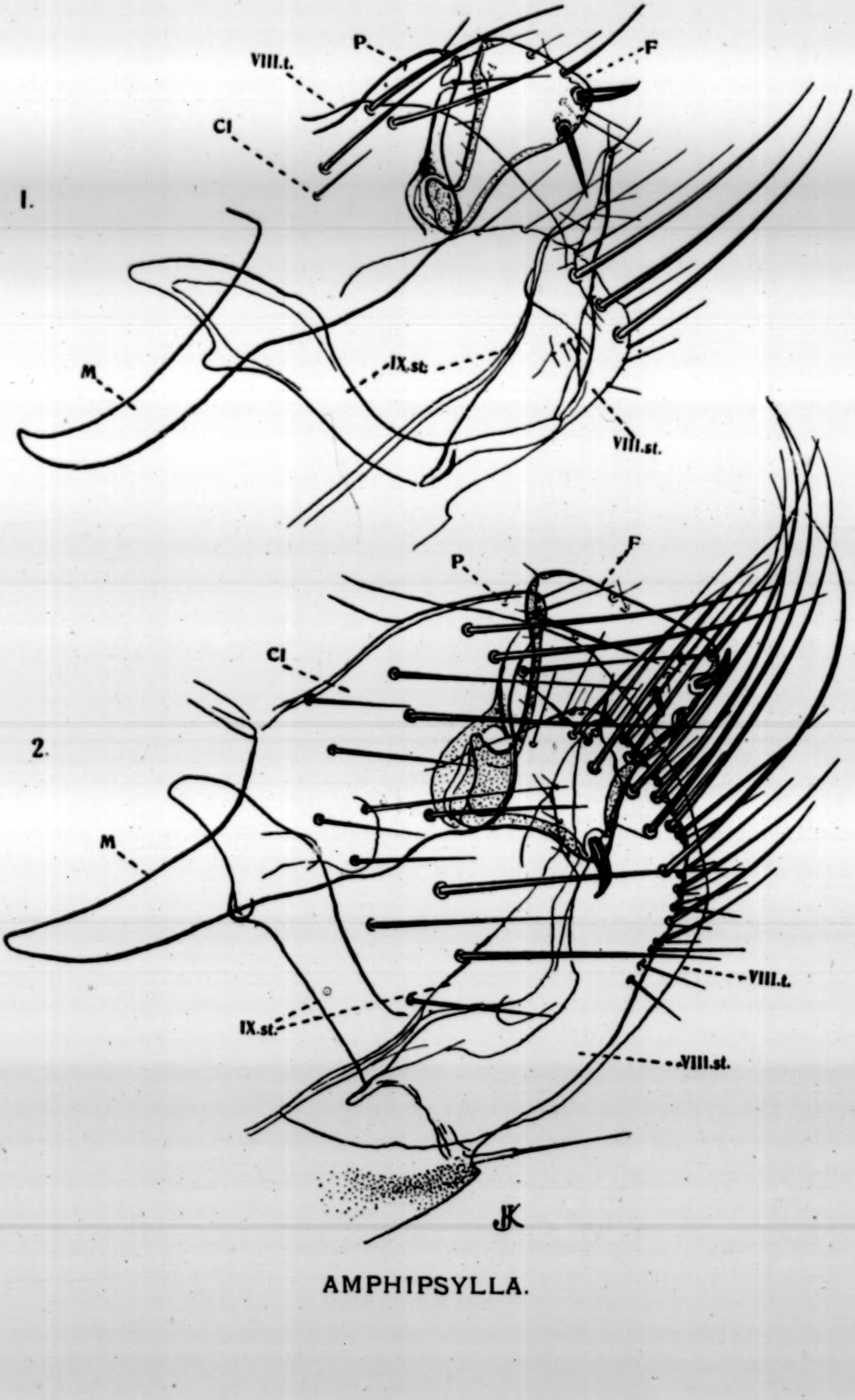

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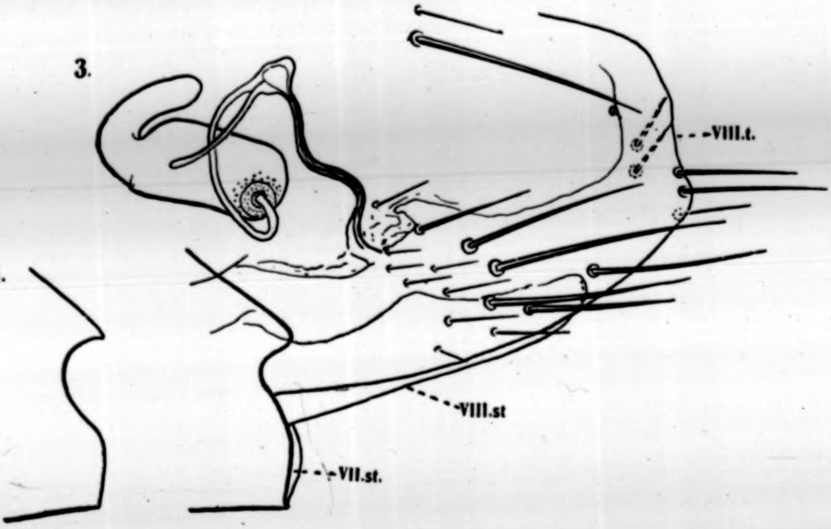

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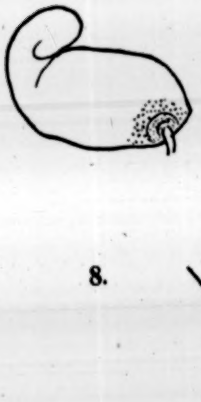

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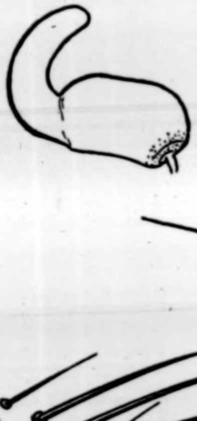

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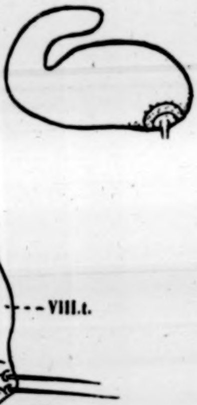

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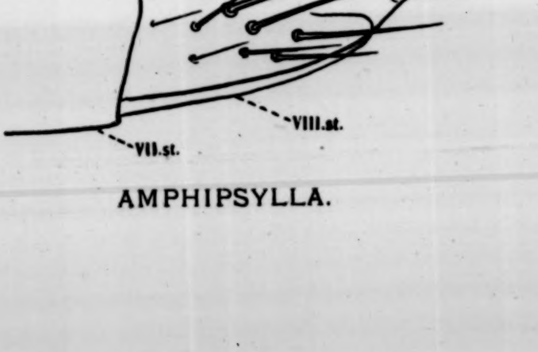

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